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mayo

FAA-2000-7119-403

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July 1, 2002

Petition for Rulemaking for FAA
C/o US Department of Transportation
Docket Management System
400 7th Street. SW
Room PL 401
Washington, DC 20591-0001

To Whom It May Concern:

This letter serves to petition the FAA to amend Docket ID 2000-7119 entitled, "Emergency Medical Equipment". We would like to have an antiepileptic drug such as a benzodiazepine or a similar agent be a mandatory component of the emergency medical kit aboard all commercial airline jets. The rationale for this action is based on an analysis of a prospective database cataloging air to ground medical consultations for Northwest Airlines by Mayo Clinic's Department of Emergency medicine. In-flight neurological complaints including life-threatening seizure conditions and status epilepticus occurred several times necessitating emergency landing and the use of medication. I have enclosed a copy of the manuscript that I authored and published in the journal Neurology June 25, 2002 detailing this analysis. The requirement of adding an antiseizure medication could save lives and improve in-flight neurological care.

I look forward to hearing your reply.

Sincerely,

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Table 2 *Incidence of neurologic symptoms and diversions over a 6-year period for a US airline*

Category	Total no. of symptoms	Incidence of symptom*	Incidence per 10 million passengers per year†	Total no. of diversions	Diversion rate (%)	Likelihood of diversion (%)	Total US cost‡ ($)
Seizures	131	26,237	4.19	31	29	24	2,583,333
Dizzy/vertigo	354	9,694	11.3	36	34	10	3,000,000
CVA	21	163,420	0.67	5	4	24	416,666
Numbness	6	571,972	0.19	0	0	0	0
Tremor	2	173,324	0.06	0	0	0	0
Headache	37	92,852	1.18	1	1	3	83,333
Pain NOS	25	137,493	0.8	5	6	20	416,666
Trauma	10	344,561	0.32	1	1	10	83,333
Confusion	6	571,972	0.19	4	3	66	333,333
LOC/syncope	34	102,137	1.08	24	22	71	2,000,000
Total cost of diversions for neurologic symptoms							8,916,664

* Incidence of one symptom every N flights based on 571,972 flights per year.

† Incidence of symptom per 10 million passengers per year based on an average of 52,022,571 passengers per year from 1995 to 2000.

‡ Total US cost at $50,000 per diversion is an extrapolation of the data, assuming that these data represent 10% of the airlines industry per year.

CVA = cerebrovascular accident; NOS = no organ system; LOC = loss of consciousness.

cardiovascular symptoms comprised the single largest category of emergency landings followed by neurologic, respiratory, and other medical symptom groups (see table 1). Overall, neurologic symptoms were the fourth most likely to cause a diversion following cardiovascular, obstetric, and respiratory incidents.

Table 2 summarizes the data regarding neurologic symptoms. Dizziness/vertigo accounted for the highest number of neurologic complaints followed by seizures, headache, pain NOS, and cerebrovascular symptoms. Seizures and dizziness/vertigo were the most common symptoms resulting in diversion. However, the likelihood of diversion was highest for loss of consciousness/syncope (71%), non-alcohol-induced confusion (66%), cerebrovascular symptoms (24%), and seizures (24%).

Rationale for diversion. For the 31 patients with seizures for whom diversions occurred, the following factors contributed to the decision: status epilepticus,[5] repetitive seizures with intermittently preserved consciousness,[6] prolonged postictal states,[7] lacerations/injury,[3] febrile convulsions in infants,[2] and diversion in progress at the time of the call despite a single seizure with recovery.[9] The only difference between the seizure cases with diversions and those without diversions was the absence of repetitive seizures and injury during the nondiverted flights.

All diversions for loss of consciousness/syncope were secondary to the crew's concern that a serious medical emergency needed immediate attention. Similarly, all 36 diversions for patients with dizziness/vertigo were results of a worry that loss of consciousness was imminent. Of the five patients with cerebrovascular symptoms for whom diversions occurred, all had progressive worsening of symptoms that led to the decision. Of the four passengers with mental status changes for whom diversions occurred, two had adverse cognitive effects due to antiparkinsonian medications. The distinguishing feature of the sole patient with headache for whom a diversion occurred was the complaint of additional neurologic symptoms.

Overall, medical complaints resulted in an aggregated cost of $26 million per year to US airlines based on unscheduled emergency landings alone, excluding costs of ground ambulances and hospital care. The overall cost of neurologic symptoms amounted to almost $9 million per year.

Discussion. The high incidence of neurologic symptoms found in this review is in agreement with a previous analysis by the FAA's Civil Aeromedical Institute, which also found that neurologic emergencies were the most common in-flight medical problem, second only to cardiac events with regard to diversions.[11] These data were based on information from two airlines and two in-flight medical care delivery categories from 1990 to 1993.[11] Related studies of in-flight medical conditions based on data from medical delivery groups have shown that neurologic emergencies consistently rank in the top three most common medical categories for both incidence and rate of unscheduled medical emergencies.[11,12] However, differences in data collection methods and classification schemes make meaningful comparisons between studies difficult.

In 1986, the FAA established the "Emergency Medical Equipment Requirements Rule" requiring large passenger aircraft to carry emergency medical kits.[2,5,11,12,15-18] At that time, the FAA set a minimum standard for medical kit contents. This rule was updated in 1994 to include protective gloves,[2,5,11,12] was revised again in 1995 to extend requirements to com-

Table 3 Comparison of requirements for emergency medical kit contents for airlines and sample airline

FAA	European Joint Aviation Authority	Air Canada	Japan Airlines	Qantas Airways
Antihistamine tablet: 25 mg	Adrenocorticosteroid	Aspirin: 350 mg	Aspirin: 500 mg	Adrenaline: 1:1,000
Antihistamine injectable: 50 mg	Antiemetic (metoclopramide)	Lorazapam: 1 mg	Atropine injectable	Anginine: 600 μg
Aspirin tablet: 325 mg	Antihistamine	Atropine: 0.6 mg/1 mL	Aminophylline injectable	Aspirin: 300 mg
Atropine: 0.5 mg, single 5-mL: ampule	Antispasmodic (hyoscine)	Diphenhydramine hydrochloride: 50 mg/mL	Berberine: 25 mg	Atropine: 600 μg/mL
Dextrose: 50%, 50 mL injectable	Aspirin	Bicarbonate: 7.5%, 50 mL	Chlorpheniramine tablets	Benztropine: 2 mg/mL
Epinephrine: 1:1,000 1 mL injectable	Atropine	Dextrose: 5%, 250 mL	Chinese herb medicine	Benzylpenicillin: 3 g
External automated defibrillator	Bronchodilator	Dextrose: 50%, 50 mL	Epinephrine	Diazepam: 10 mg/2 mL
Epinephrine: 1:10,000, 2 mL injectable	Digoxin	Epinephrine: 1 mL 1:1,000	Diazepam injectable	Furosemide: 50 mg/5 mL
Inhaled bronchodilator	Diuretic (furosemide)	Glucagon: 1 mg	Dopamine injectable	Haloperidol: 10 mg/mL
Lidocaine: 5 mL, 20 mg/mL	Epinephrine: 1:1000	Gravol: 250 mg	Furosemide injectable	Hyoscine: 20 mg/mL
Nitroglycerin tablets: 0.4 mg	Hypertonic glucose	Haloperidol: 5 mg/1 mL	Fradiomycin sulfate gauze	Lignocaine: 100 mg/5 mL
Nonnarcotic analgesic, 325 mg	Major analgesic (nalbuphine)	Propranolol hydrochloride: 1 mg/mL	Glycerin enema	Loperidol capsules
	Nitroglycerin	Instaglucose	Hydrocortisone injectable	Morphine: 15 mg/mL
	Sedative/anticonvulsant (diazepam)	Furosemide: 40 mg/4 mL	Isosorbide dinitrate: 5 mg	Naloxone: 0.4 mg
	Uterine-contracting agent (ergometrine/oxytocin)	Lidocaine: 100 mg/5 mL	Lidocaine injectable	Paracetamol suppository
		Morphine: 15 mg/mL	Methylergometrine injectable	Phenytoin: 100 mg
		Nitroglycerin: 1:200	Nitroglycerin tablets	Prednisolone: 25 mg
		Procainamide: 10 mL, 100 mg/mL	Nifedipine capsules	Prochlorperazine: 12.5 mg/mL
		Solumedrol: 125 mg	Pabron Gold	Promethazine: 50 mg/2 mL
		Tylenol 2	Ritodrine tablets	Oxytocin: 10 IU in 1 mL
		Diazepam: 10 mg/2 mL	Scopolamine injectable	Diazepam: 5 mg
		Albuterol	Sodium bicarbonate injectable	Albuterol inhaler
			Sulpyrine injectable	Verapamil: 80 mg
			Terbutaline injectable	

Saline solution was not listed because all kits included this item. Underlined items are pertinent to neurologic symptoms.

FAA = Federal Aviation Administration.

muter planes,[2,5,11,12] and was most recently amended in 1998 to include automated external defibrillators.[2,5,11,12]

Table 3 summarizes current requirements of the FAA,[2,5,11,12] European Aviation Authority guidelines,[15,18] and examples of three large international carrier's medical kits.[15,18] On the basis of the results of this study, consideration of including AED is warranted. As depicted in table 3, the European Aviation Authority adopted an AED requirement as a standard medical supply with the presence of diazepam. The Australian-based Qantas Airways stocks phenytoin tablets along with diazepam onboard its jets.[15,18] However, there are challenges in the United States associated with selecting the appropriate seizure medication, particularly regarding Drug Enforcement Agency–scheduled drugs such as benzodiazepines. At the time of the last FAA rule update in 1998, the agency disagreed with a proposal to include AED because no data were provided to confirm the necessity of this addition.[2]

In-flight personnel in the United States are trained in emergency medical procedures, operation of medical equipment, use of the emergency medical kit, and use of automated external defibrillators.[2] They are certified in standard cardiopulmonary resuscitation and first aid as well as in each airline's own first aid protocol for various emergencies of which seizures and stroke are included,[2] but they are not required to meet proficiency standards established for emergency medical personnel. The Association of Flight Attendants reported that members receive first aid instruction that ranges from a minimum of 30 minutes to a few hours.[19] The high percentage of diversions, which is associated with a high economic impact, mandates that decision making pertaining to the medical necessity of diversion and

adequacy of in-flight treatment should be evaluated given implications of such information both as an important public health issue and as a matter of economic justification.

An obvious question arising from these data is why are neurologic complaints more common than other in-flight complaints? The answer may be related to the unusual nature of the cabin environment, specifically with pressurization, turbulence, and hypoxemia. For example, alveolar oxygen pressure in a plane that is pressurized to a differential of 8.6 to 11.77 psi (a common pressurization range of commercial jets) flying at 35,000 feet may vary from 59 to 76.8 mm Hg.[20] The pressure differential varies slightly between aircraft models, but it typically is equivalent to 6,000 to 8,000 feet above sea level. Thus, it may not be surprising to see a high incidence of dizziness/vertigo, headaches, and seizures in this setting.[21] In addition, seizures and other symptoms likely occur from dehydration, sleep deprivation, stress, and heightened effects of alcohol or medications, all of which are commonly associated with air travel.[20,21]

The high incidence of diversions resulting from seizures was not unexpected because their dramatic presentations likely led to an immediate call for attention from passengers and flight crews. Similarly, dizziness/vertigo is also likely to lead to increased attention from airline personnel. The relatively low rate of diversion for cerebrovascular symptoms may indicate a greater need for both flight crews and the public to be made more aware of stroke symptoms and treatment. Because early intervention for cerebrovascular disease may be crucial, the problem of brief, resolved transient ischemic attacks in the airline environment presents a unique challenge in deciding whether to divert. This issue needs to be explored in further detail.

Despite the low occurrence of non-alcohol-related mental status changes, cognitive changes were associated with a high likelihood of diversion. This may also indicate a need for additional education and training of flight crews with regard to scenarios involving confused passengers, particularly because none of these patients were violent. Moreover, the fact that two of the four diversions were related to antiparkinsonian medications also suggests that patients should be counseled about flying when medication adjustments are being made or when the severity or unpredictability of "on" and "off" periods is high.

These data are unique and provide the first structured assessment of in-flight neurologic symptoms. However, there are several limitations of this study. The physicians responsible for the Mayo In-flight Advisory Report's database categorized problems based on limited clinical information and in the absence of follow-up data. However, a previous study comparing in-flight diagnoses to postflight hospital diagnoses found an agreement of 94% for neurologic symptoms with use of a similar classification scheme.[11,12] Thus, these categorizations are believed to be good indicators of neurologic symptom profiles. Clearly, more empirical findings are needed to verify these results, including specific follow-up information regarding diagnosis, treatment, and outcome. Such studies will be challenging, because airlines are not currently required to log medical complaints and any existing data are not readily available to clinical investigators.

The incidence found in this review is conservative and likely underestimates the actual incidence. Flight crews do not routinely report minor in-flight medical incidents that do not require air-to-ground medical support. Thus, this study represents only those symptoms that led to alerting the ground medical consultant and excludes events dismissed by flight personnel as requiring medical intervention. The economic impact reflected in these data is conservative; the "true" impact is likely higher. Although the data presented here are limited to the experience of a single US airline, 50 million passengers fly this airline yearly, and the issues and implications of these findings extend to the industry in general. It is recognized that airlines may manage emergency neurologic conditions differently, resulting in higher or lower diversion rates. An ideal future study might further examine the impact of diversions on symptom outcome, although the logistics of systematically examining such issues will be challenging.

How should neurologists, emergency medicine physicians, and primary care physicians counsel patients with neurologic illnesses about flying? Several general suggestions can be made. Patients with chronic neurologic conditions should avoid alcoholic beverages. Medication compliance is essential. Individuals with chronic headache and other pain conditions should carry additional analgesics. Those patients with epilepsy should have extra doses of AED, and medication changes should be carefully scrutinized or postponed until travel is completed to avoid potential problems.

Although neurologic complaints occurred more often than other medical symptoms, the likelihood of these serious symptoms occurring in-flight is quite low, affecting only 0.01% of all flights. However, it is valuable for neurologists, as well as other physicians, to be familiar with emergency medical kit contents stored on commercial airlines, because they may be called upon to manage in-flight emergencies and to provide advice regarding the need for diversion (as two of the authors [J.I.S. and R.C.] have experienced). Perhaps the neurology community should consider proposing policy changes to the FAA that would require AED in the onboard medical kit, establish guidelines for in-flight neurologic emergencies, and address minimum training requirements for flight personnel.

Acknowledgment

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NEUROLOGY 2002;58:1717

Editorial

In-flight neurologic emergencies

Arthur J. Moss, MD; and William T. Longstreth, Jr., MD

In the late 1980s, a group of cardiologists, including one author of this editorial (A.J.M.), contacted several major American and foreign airlines and recommended placement of automatic external defibrillators (AED) on all transcontinental and transoceanic flights. Qantas Airlines responded favorably, and in 1991 external defibrillators were installed in the major international Australian terminals and into each of 55 international Boeing 747 and 767 aircraft with appropriate training of flight personnel. Within a short time after placement of the defibrillators on Qantas planes, a passenger flying from Australia to Los Angeles was successfully resuscitated in-flight from cardiac arrest using an AED. During a 64-month period, Qantas reported that the defibrillator was used six times for resuscitation from ventricular fibrillation, with five successful cardioversions and two long-term survivors.[1] In the United States, a passenger died from an in-flight cardiac arrest on a domestic flight on which a defibrillator was not available. A medical liability case against the carrier resulted in AED being placed on some US planes, with a subsequent directive from the Federal Aviation Administration that recommended placement of AED on all major US commercial jets.[2]

Has the time come for a group of senior neurologists to contact the major US carriers and the Federal Aviation Administration to discuss the risks and benefits of including antiepileptic drugs in emergency medical kits available on fights? The study reported by Sirven et al. in this issue of *Neurology* suggests the time is ripe.[3] It describes the medical emergencies logged in a prospective database utilizing all air-to-ground medical consultations from 1995 to 2000 involving one US airline carrier. Over a 6-year period, more than 2,000 in-flight medical incidents occurred during 4 million flights flown by the carrier. This number likely underestimates such incidents because it does not include all episodes of medical care provided by flight attendants or other passengers with medical expertise. Medical calls were most frequently related to neurologic symptoms, with cardiovascular, gastrointestinal, and respiratory symptoms in aggregate equaling the number of neurologic symptoms. Neurologic and cardiovascular symptoms were equally frequent as a cause for diversion of the flight to an urgent unscheduled landing. Dizziness and vertigo accounted for 56% of the neurologic symptoms; seizures, 21%; and syncope, 5%. Although syncope is classified in this report as a neurologic disorder, the underlying cause is frequently a cardiac arrhythmia that can be life threatening. Syncope had the highest probability of being associated with diversion of the flight.

The work of Sirven et al. points the way to improve in-flight medical care. All episodes of such care should involve air-to-ground consultation to allow better documentation than is currently available and to standardize treatments. Just as frequent flier programs are based on miles, not number of flights, medical events should be reported per person-miles and linked to outcomes. Only with such information can in-flight care be optimized. Given the frequency of in-flight neurologic problems, neurologists should have a key role in devising protocols to handle in-flight medical emergencies. Given the 131 seizures that occurred in one airline carrier over 6 years, one of the most pressing issues relates to the lack of antiepileptic drugs on most flights. Would you want to care for a patient in status epilepticus at 32,000 feet without an antiepileptic drug?

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CME Is there a neurologist on this flight?

J.I. Sirven, MD; D.W. Claypool, MD; K.L. Sahs, RN; D.M. Wingerchuk, MD; J.J. Bortz, PhD; J. Drazkowski, MD; R. Caselli, MD; and D. Zanick, MD

Abstract—*Objective:* To analyze the frequency of neurologic events during commercial airline flights and to assess whether onboard emergency medical kits are adequate for in-flight neurologic emergencies. *Methods:* Collaboration of the Mayo Clinic's Departments of Emergency Medicine and Medical Transportation Service and the Division of Aerospace Medicine to provide real-time in-flight consultation to a major US airline that flies ≈10% of all US passengers. We analyzed all medical events reported from 1995 to 2000 in a database that catalogs the air-to-ground medical consultations. All cases with potential neurologic symptoms were reviewed and classified into various neurologic symptom categories. The cost of diversion for each neurologic symptom was calculated and then extrapolated to assess the cost of neurologic symptoms to the US airline industry. *Results:* A total of 2,042 medical incidents led to 312 diversions. Neurologic symptoms were the single largest category of medical incidents, prompting 626 air-to-ground medical calls (31%). They caused 34% of all diversions. Dizziness/vertigo was the most common neurologic symptom followed by seizures, headaches, pain, and cerebrovascular symptoms. Whereas seizures and dizziness/vertigo were the most common reasons for diversion, loss of consciousness/syncope was the complaint most likely to lead to a diversion. The estimated annual cost of diversions due to neurologic events is almost $9,000,000. *Conclusion:* Neurologic symptoms are the most common medical complaint requiring air-to-ground medical support and are second only to cardiovascular problems for emergency diversions and their resultant costs to the US airline industry. Adding antiepileptic drugs to the onboard medical kit and greater emergency medical training for in-flight personnel could potentially reduce the number of diversions for in-flight neurologic incidents.

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The commercial airline industry transported ≈600 million US passengers in the year 2000. As the number of air travelers has steadily risen over the past 5 years[1] and as the population rapidly ages, it follows that the number of older passengers as well as passengers with chronic or serious medical problems will also increase. Heightened attention to in-flight medical problems recently resulted in the introduction of automated external defibrillators on US commercial jets,[2-5] underscored concerns of pulmonary embolism from prolonged flights,[5-10] and highlighted an increased occurrence of behavioral outbursts or "air rage." To date, the incidence of various in-flight neurologic symptoms has not been systematically assessed, because US airlines do not uniformly report medical emergencies or emergency medical landings.[2,11-13]

When a medical emergency occurs on an aircraft, the pilot in command has the final authority of how to best deal with the emergency, taking into the account not only the medical problem of the passenger but also the safety and well-being of all the passengers and flight crew in their charge. In such situations, the flight crew typically asks passengers with medical training to volunteer aide in patient care. Every aircraft has a medical kit for use by physicians, with minimum contents mandated by the Federal Aviation Administration (FAA).[2] Most US carriers have arranged for consultation from ground-based medical providers with in-flight medical experience to assist and supervise the flight crew, passenger volunteers, and nonphysicians in using the emergency medical kit. The medical support occurs verbally by radio or air phone. The medical provider may speak to the pilot, cabin crew, medical volunteers, or stricken passenger(s) to suggest and guide use of the onboard medical kit or to help decide if a plane needs to make an unscheduled emergency landing (i.e., diversion). Such medical ground consultations are initiated at the discretion of the pilot in command.

The Departments of Emergency Medicine and Medical Transportation Service and the Division of Aerospace Medicine at Mayo Clinic collaborate to

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Table 1 *Mayo In-flight Advisory Report's symptom classification of air-to-ground medical calls for a US airline over a 6-year period*

Category	Total no. symptoms	Incidence (%)	Total no. of diversions	Diversion rate (%)	Likelihood of diversion* (%)
Allergies	71	4	4	1	6
Bleeding	42	2	6	2	14
Cardiovascular	274	13	108	35	39
Deaths	8	0	1	0	13
Diabetes	72	4	6	2	8
Gastrointestinal	201	9	21	7	10
Infection	165	8	1	0	0.1
Neurologic	626	31	107	34	17
Obstetric	46	2	11	4	24
Respiratory	173	9	30	9	17
Psychiatric/intoxication	46	2	2	1	4
Unknown/undefinable	318	16	15	5	5

* Total no. of diversions by category/total no. of symptoms.

provide real-time in-flight consultations to a major US airline. The clientele of this airline is representative of the US flying public, constituting ≈10% of all US passengers. In this study, we reviewed the Mayo Clinic–airline collaborative experience to assess the adequacy of care for in-flight neurologic incidents. We sought to determine whether current emergency medical equipment and medications aboard commercial airliners are appropriate for neurologic incidents and, in particular, whether antiepileptic drugs (AED) should be added to onboard emergency medical kits. To this end, we examined the frequency of, reasons for, and cost of urgent unscheduled landings for neurologic symptoms. The frequency of emergency diversions is an important outcome measure because they are the direct result of either a serious medical problem requiring immediate hospitalization or an inability to properly assess or effectively treat an onboard patient.

Methods. All emergency calls from one carrier were logged into the Mayo In-flight Advisory Report database, which records in-flight symptoms, age of the patient, flight number, aircraft position, recommendation regarding use of the medical kit, and whether an emergency landing was needed. All reports are then categorized into one of several symptom groups defined by the authors of the Mayo In-flight Advisory Report (table 1). No uniformly defined categories are used by all airlines. The database of the Mayo In-flight Advisory Report contains a record of all in-flight events from 1995 to 2000. All potential neurologic events were culled from all reports independently and subcategorized by two neurologists (J.I.S. and D.M.W.) into various neurologic symptoms (table 2). The annual incidence per year for neurologic symptoms as a group was calculated, and neurologic symptoms were separately tabulated based on the average yearly number of flights and US passengers flown by that carrier over the 6-year period.

The incidence of diversion and the likelihood of an emergency landing were documented for each symptom. The likelihood of diversion was defined as the number of diversions of each respective symptom divided by the frequency of the symptom. The estimated cost of a diversion may range from $15,000 to as high as $893,000[14] on some international routes, depending on the length of delay, the airport that the plane is diverted to, and whether fuel must be dumped to maintain a safe landing weight. Because the airline industry does not publish estimates regarding the average cost of a single diversion, relevant calculations were made based on a conservative estimate of a minimum cost of $50,000 per diversion. This estimate was consensually determined by the medical directors of this US carrier (D.Z.) and those of five international airlines for the purpose of establishing the magnitude of aggregated costs. For purposes of this analysis, it was also assumed that the cost of a diversion did not vary between medical conditions. On the basis of this figure, the minimum expense of neurologic symptoms to the carrier was calculated, and the economic data were extrapolated to estimate costs to the US airline industry as a whole. This airline carried 9.74% of all US passengers and flew 12.05% of the total miles flown by US airlines from 1995 to 2000, as determined by the Air Transport Association.[1] The total cost to the US airline industry was determined by extrapolating from these data representing 10% of US flights and airline passengers.

Results. During a total of 4,003,809 flights (571,972 flights per year) flown by the carrier from 1995 to 2000, there were 2,042 separate in-flight incidents requiring medical consultations. Table 1 shows the breakdown of all medical incidents. Neurologic symptoms comprised the single largest symptom category followed by unknown/undefinable, cardiovascular, gastrointestinal, and respiratory incidents. The balance of the calls was from other categories, including deaths (see table 1). None of the deaths were neurologic in origin; rather, the deaths occurred in patients with terminal cancer who were being flown home where they were expected to die.

Of the 2,042 medical incidents, 312 (15.2%) resulted in unscheduled emergency landings or diversions. Although neurologic symptoms prompted the most emergency calls,